

CALIFORNIA HIGH-SPEED TRAIN

Program Environmental Impact Report/Environmental Impact Statement

Los Angeles - Orange County - San Diego

AESTHETICS & VISUAL QUALITY TECHNICAL EVALUATION

January 2004

Prepared for:

California High-Speed Rail Authority

U.S. Department of Transportation
Federal Railroad Administration



U.S. Department
of Transportation
**Federal Railroad
Administration**

CALIFORNIA HIGH-SPEED TRAIN PROGRAM EIR/EIS

Los Angeles – Orange County – San Diego **Aesthetics & Visual Quality Technical Evaluation**

Prepared by:

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for

IBI GROUP

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ACRONYMS

AUTHORITY	CALIFORNIA HIGH-SPEED RAIL
CEQA	CALIFORNIA ENVIRONMENTAL QUALITY ACT
COG	COUNCIL OF GOVERNMENTS
EIR	ENVIRONMENTAL IMPACT REPORT
EIS	ENVIRONMENTAL IMPACT STATEMENT
EPA	ENVIRONMENTAL PROTECTION AGENCY
FAA	FEDERAL AVIATION ADMINISTRATION
FHWA	FEDERAL HIGHWAY ADMINISTRATION
FRA	FEDERAL RAILROAD ADMINISTRATION
FTA	FEDERAL TRANSIT ADMINISTRATION
LOSSAN	LOS ANGELES TO SAN DIEGO CONVENTIONAL RAIL CORRIDOR
NEPA	NATIONAL ENVIRONMENTAL POLICY ACT
MTA	METROPOLITAN TRANSPORTATION AUTHORITY
PCH	PACIFIC COAST HIGHWAY
RTP	REGIONAL TRANSPORTATION PLAN
USACE	UNITED STATES CORPS OF ENGINEERS
USFWS	UNITED STATES FISH AND WILDLIFE SERVICE

1.0 INTRODUCTION

The California High-Speed Rail Authority (Authority) was created by the Legislature in 1996 to develop a plan for the construction, operation, and financing of a statewide, intercity high-speed passenger train system.¹ After completing a number of initial studies over the past six years to assess the feasibility of a high-speed train system in California and to evaluate the potential ridership for a variety of alternative corridors and station areas, the Authority recommended the evaluation of a proposed high-speed train system as the logical next step in the development of California's transportation infrastructure. The Authority does not have responsibility for other intercity transportation systems or facilities, such as expanded highways, or improvements to airports or passenger rail or transit used for intercity trips.

The Authority adopted a *Final Business Plan* in June 2000, which reviewed the economic feasibility of a 1,127-kilometer-long (700-mile-long) high-speed train system. This system would be capable of speeds in excess of 321.8 kilometers per hour (200 miles per hour [mph]) on a dedicated, fully grade-separated track with state-of-the-art safety, signaling, and automated train control systems. The system described would connect and serve the major metropolitan areas of California, extending from Sacramento and the San Francisco Bay Area, through the Central Valley, to Los Angeles and San Diego. The high-speed train system is projected to carry a minimum of 42 million passengers annually (32 million intercity trips and 10 million commuter trips) by the year 2020.

Following the adoption of the Business Plan, the appropriate next step for the Authority to take in the pursuit of a high-speed train system is to satisfy the environmental review process required by federal and state laws which will in turn enable public agencies to select and approve a high speed rail system, define mitigation strategies, obtain necessary approvals, and obtain financial assistance necessary to implement a high speed rail system. For example, the Federal Railroad Administration (FRA) may be requested by the Authority to issue a *Rule of Particular Applicability*, which establishes safety standards for the high-speed train system for speeds over 200 mph, and for the potential shared use of rail corridors.

The Authority is both the project sponsor and the lead agency for purposes of the California Environmental Quality Act (CEQA) requirements. The Authority has determined that a Program Environmental Impact Report (EIR) is the appropriate CEQA document for the project at this conceptual stage of planning and decision-making, which would include selecting a preferred corridor and station locations for future right-of-way preservation and identifying potential phasing options. No permits are being sought for this phase of environmental review. Later stages of project development would include project-specific detailed environmental documents to assess the impacts of the alternative alignments and stations in those segments of the system that are ready for implementation.

The decisions of federal agencies, particularly the Federal Railroad Administration (FRA) related to high-speed train systems, would constitute major federal actions regarding environmental review under the National Environmental Policy Act (NEPA). NEPA requires federal agencies to prepare an Environmental Impact Statement (EIS) if the proposed action has the potential to cause significant environmental impacts. The proposed action in California warrants the preparation of a Tier 1 Program-level EIS under NEPA, due to the nature and scope of the comprehensive high-speed train system proposed by the Authority, the need to narrow the range of alternatives, and the need to protect/preserve right-of-way in the future. FRA is the federal lead agency for the preparation of the Program EIS, and the Federal Highway Administration (FHWA), the U.S. Environmental Protection Agency (EPA), the U.S. Corps of Engineers (USACE), the Federal Aviation Administration (FAA), the U.S. Fish and Wildlife Service (USFWS), and the Federal Transit Administration (FTA) are cooperating federal agencies for the EIS.

A combined Program EIR/EIS is to be prepared under the supervision and direction of the FRA and the Authority in conjunction with the federal cooperating agencies. It is intended that other federal, state,

¹ Chapter 796 of the Statutes of 1996; SB 1420, Kopp and Costa

regional, and local agencies will use the Program EIR/EIS in reviewing the proposed program and developing feasible and practicable programmatic mitigation strategies and analysis expectations for the Tier 2 detailed environmental review process which would be expected to follow any approval of a high speed train system.

The statewide high-speed train system has been divided into five regions for study: Bay Area-Merced, Sacramento-Bakersfield, Bakersfield-Los Angeles, Los Angeles-San Diego via the Inland Empire, and Los Angeles-Orange County-San Diego. This Visual Resource Technical Evaluation for the Los Angeles-Orange County-San Diego region is one of five such reports being prepared for each of the regions on the topic, and it is one of fifteen technical reports for this region. This report will be summarized in the Program EIR/EIS and it will be part of the administrative record supporting the environmental review of alternatives.

1.1 VISUAL ANALYSIS METHODOLOGY

The visual resource analysis for this program-level EIR/EIS is focused on a broad comparison of potential impacts to visual resources (particularly scenic resources or sensitive viewing areas) along corridors for each of the alternatives (high-speed train and modal alternatives) and around stations. The potential impacts for each of these alternatives are compared with the No-Project Alternative.

Because the region covers a number of different types of landscapes over a large geographic area (open-rural landscape, highly vegetated natural area, densely developed urban landscape, open barren landscape, etc), a typology of landscapes is used to characterize the landscapes in the region that are within ¼ mile of the alternative corridors and stations. An example of each type of landscape is described in terms of the foreground, middle ground and background dominant features that make up its distinguishable color, texture, line, and form. The typology includes landscapes that are particularly scenic in the region, as well as landscapes that are typical. This makes up the baseline existing conditions against which the analysis of change or impact for each of the alternatives is compared. Photographs of the existing features for each of seven landscapes illustrate the dominant line, form, color and texture for that landscape type. The viewing points for each photograph of each landscape type are shown on the project Geographic Information System (GIS) map.

The summary tables for the region identify scenic/visual resources within the ¼ mile study area for each of the corridor segments and around station sites for the High-Speed Train Alternative, and along highway corridors and around airports for the Modal Alternative. Reference to the unique scenic landscapes and the typical landscapes described and illustrated in the typologies is made in the tables. Of particular concern are elevated structures (guideways or overpasses), and tunnel portals. Also of concern are the potential shadow effect of elevated structures and the light and glare effects of the alternatives. These changes, or visual impacts, are described and ranked as 'high', 'medium', or 'low' in the summary table according to the potential extent of change to scenic visual resources.

For selected landscapes, an alternative (high-speed train or modal) is then photo-simulated on the landscape photographs to illustrate if, and how, the dominant visual features that characterize the landscape would change if the alternative were implemented.

CEQA criteria for significant visual impacts includes, would the project:

- Have a substantial adverse effect on a scenic vista?
- Substantially damage scenic resources, including, but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway?
- Substantially degrade the existing visual character or quality of the site and its surroundings?
- Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area?

Each of the CEQA criteria are considered in the ranking of potential impacts.

1.2 SENSITIVE VIEWING POINTS AND LANDSCAPE TYPOLOGIES IN REGION

The sensitive viewing points for the Los Angeles-Orange County-San Diego Region are shown on Figure 2-1 in Section 2 of this report. Each is described briefly below, along with the reason that it was selected for analysis. The landscape visible from each viewpoint is described in terms of distinguishable (dominant) features that characterize the color, texture, line and form in the foreground, middle-ground, and back-ground.

- Viewpoint No. 1 - An Urban Environment typical in the region, in the area of a proposed rail station along the existing Union Pacific Railroad Santa Ana rail line in Norwalk. This is the site of a proposed elevated station along a proposed High-Speed Rail alignment. The area is highly developed with a mixture of commercial and industrial uses along with surrounding residential areas. Typical monotone box structures define the commercial uses along heavily traveled roadways. The area is relatively flat, with minimal landscaping or vegetation. Views are primarily restricted to the foreground due to the density of development.
- Viewpoint No. 2 – An Urban Environment along the existing LOSSAN rail corridor at the Dana Point curve. The existing rail corridor in the Dana Point area crosses through a moderately populated, monotone industrial and business area and traverses across flat and subtle terrain, with the ocean and Pacific Coast Highway located to the west. Hotels and homes are along the east side of the Pacific Coast Highway above the roadway and tracks. This viewpoint is dominated by the strong, linear form of the rail corridor and parallel fences on either side. The topography transitions from flat to sloped terrain in the background.
- Viewpoint No. 3 - An example of a Coastal Community typology is shown with a viewpoint in San Clemente, looking north from an existing pedestrian footbridge located just south of the pier. The existing rail corridor is located along the flat and even shoreline and beaches. The tracks run along the base of cliffs to the east. The strong, horizontal line of the rail corridor interlocks and contrasts with the strong, vertical line of the cliffs. Residences along the bluff tops provide highly scenic, distant views of the shoreline and ocean.
- Viewpoint No. 4 - A regional example of the Suburban Environment is shown in a view in Carlsbad looking south along the existing LOSSAN rail corridor. The existing tracks traverse through a moderately dense, visually harmonious business district. The flat, linear forms of the roadway and rail corridor dominate the foreground view. Large trees and other vegetation help to break the strong, linear forms and add color in the middle- and background views.
- Viewpoint No. 5 - As an example of Open Space in the region, this view shows the existing bridge crossing of the Batiquitos Lagoon, looking east from Carlsbad Boulevard/ Coast Highway 101. The existing rail tracks parallels the east side of Coast Highway 101 traversing the lagoon in a north-south direction. The lagoon provides color and textural contrast to the surrounding area, and dominates the viewpoint. The strong linear form of the bridge is also prominent in the middle-ground view. Residences located north and south of the lagoon are visible in the background.
- Viewpoint No. 6 - As another example of a Coastal Community, Viewpoint No 6 in Cardiff shows the view looking south with Coast Highway 101 and the ocean in the background. The existing rail corridor is located just east of and above Coast Highway 101. The avenue is lined with small businesses with uniform facades. The terrain changes and the presence of trees and other vegetation in the middle- and background add color and some textural contrast to the view.
- Viewpoint No. 7 – A view looking north along the bluffs at Del Mar, a suburban Coastal Community. The existing LOSSAN rail corridor is located along the bluffs above the

shoreline/beaches and below the residential homes. The landscape transitions from the ocean up to the top of the bluffs. The existing tracks are set between the shoreline below and the residential homes above, along a narrow portion of the bluffs. The strong, horizontal line of the rail corridor along the bluff tops contrasts with the strong, vertical line of the bluffs in the foreground and middle-ground. The ocean, in the far middle- and background, and the vegetation along the bluffs provide strong color and textural variety. The horizontal form of the rail corridor interlocks with the vertical line of the bluffs, creating a strong edge effect.

Much of the existing rail and highway system in the southern part of the Los Angeles – Orange County – San Diego Region traverses parallel to the Pacific coast line. Interstate 5 (evaluated in this study under the Modal Alternative, described in Section 1.4.2) provides only one or two isolated views of the ocean. The existing LOSSAN rail corridor does provide passengers with scenic views of the ocean and open spaces along portions of its route. There are no state-designated scenic corridors in the study area for visual resources, though some highways (Pacific Coast Highway 1, for example) are considered eligible for designation as California State Scenic Routes and are located near the existing rail corridor. Within the study area for this project, these routes do not provide the public with continuous views of the ocean.

1.3 ALTERNATIVES

1.3.1. No-Project Alternative

The No-Project Alternative serves as the baseline for the comparison of Modal and High-Speed Train alternatives (Figure 1-1). The No-Project Alternative represents the state's transportation system (highway, air, and conventional rail) as it existed during 1999 to 2000 and as it would be after implementation of programs or projects currently programmed for implementation and projects that are expected to be funded by 2020. The No-Project Alternative addresses the geographic area serving the same intercity travel market as the proposed high-speed train (generally from Sacramento and the San Francisco Bay Area, through the Central Valley, to Los Angeles and San Diego). The No-Project Alternative satisfies the statutory requirements under CEQA and NEPA for an alternative that does not include any new action or project beyond what is already committed.

The No-Project Alternative defines the existing and future statewide intercity transportation system based on programmed and funded (already in funded programs/financially constrained plans) improvements to the intercity transportation system through 2020, according to the following sources of information:

- State Transportation Improvement Program (STIP)
- Regional Transportation Plans (RTPs) for all modes of travel
- Airport plans
- Intercity passenger rail plans (California Rail Plan 2001-2010, Amtrak Five- and Twenty-year Plans)

The No-Project Alternative for the Los Angeles-Orange County-San Diego Region includes highway expansion as well as conventional rail improvements to the existing LOSSAN corridor that are programmed and funded for implementation through 2020. Table 1-1 summarizes the infrastructure components of the No-Project Alternative for this Region. As with all of the alternatives, the No-Project Alternative will be assessed against the purpose and need topics/objectives for congestion, safety, air pollution, reliability, and travel times.

FIGURE 1-1

No-Project Alternative – California Transportation System



Source : Parsons Brinckerhoff, 2002

FIGURE 1-1

TABLE 1-1

PROGRAMMED IMPROVEMENTS INCLUDED IN THE NO-PROJECT ALTERNATIVE
LOS ANGELES-ORANGE COUNTY-SAN DIEGO REGION
 (from 1998 and 2000 Regional Transportation Plans)

County	Type of Project	Description
INTERCITY HIGHWAY PROJECTS		
Los Angeles	HOV	HOV Project on SR-14 (Ave P-8 to Ave-L)
Los Angeles	HOV	HOV Project on I-710 (I-10 to I-210)
Los Angeles	HOV	HOV Project on I-5 (SR-19 to I-710)
Los Angeles	Highway Widening	I-710 (I-10 to I-210) Additional Mixed Flow Lane
Los Angeles	Highway Widening	I-5 (Rosecrans to Orange Co) Additional Mixed Flow Lane
Los Angeles	Highway Widening	I-405 (US-101 to I-105) Additional Mixed Flow Lane
Los Angeles	Highway Widening	SR-57 (SR-60 to Orange Co) Additional Mixed Flow Lane
Orange	HOV	HOV Project on I-5 (SR-1 to Avenida Pico)
Orange	Highway Widening	I-5 (SR-91 to Los Angeles Co) Additional Mixed Flow Lane
Orange	Highway Widening	SR-91 (westbound auxiliary lane SR-57 to I-5) Additional Mixed Flow Lane
Orange	Highway Widening	SR-91 (auxiliary lanes SR-241 to SR-71) Additional Mixed Flow Lane
Orange	Highway Widening	SR-57 (auxiliary lanes Los Angeles Co to SR-91) Additional Mixed Flow Lane
San Diego	Highway Interchange/Widening	I-5 at I-805 – New interchange with 10 freeway and 2 HOV lanes.
San Diego	Highway Widening	I-5 from Mission Bay Drive to SR-52 – Addition of a northbound auxiliary lane
San Diego	Highway Widening	I-5 at SR-78 Interchange: NB-EB Connector – Widen auxiliary lane and ramp.
San Diego	Highway Widening	I-15 from SR-163 to SR 78 – Addition of auxiliary lanes and meters. Bridge widening
San Diego	Highway Widening	I-15 from SR-56 to Centre City Parkway – Addition of 4 HOV/Managed lanes
San Diego	Highway Widening/HOV	I-5 from Del Mar Heights Road to Birmingham Drive – Upgrade from existing lane freeway to 12-lane freeway and 2 HOV lanes.
San Diego	Highway Interchange	I-15/SR-56 Interchange Ramp (EB-NB) – Loop ramp.
San Diego	Highway Widening/HOV	I-5 from Del Mar Heights Road to Encinitas Boulevard – Upgrade from 8-lane freeway to 12-lane freeway and 2 HOV lanes.
San Diego	Highway	I-5 from Encinitas Boulevard to La Costa Boulevard – Upgrade from 8-lane freeway to 10-lane freeway and 2 HOV lanes.
San Diego	Highway	I-15 from SR-163 to SR-56 – Addition of 4 HOV/Managed lanes.
San Diego	TSM	Intelligent Transportation Systems: Enhanced Incident/Emergency Response, Traveler/Commercial Vehicle Operations Information, and Management System Software.
CONVENTIONAL RAIL IMPROVEMENTS		
Los Angeles	Conventional Rail	Run through tracks at L.A. Union Station
Los Angeles	Conventional Rail	Continuous third main track from Union Station to Fullerton
Orange	Conventional Rail	Double tracking along Lincoln Avenue in Santa Ana
San Diego	Conventional Rail	Extension of Double-Track at San Onofre
San Diego	Conventional Rail	Extension of Double-Track in Oceanside
San Diego	Conventional Rail	Sorrento-Miramar Double-Tracking and Curve Realignment
San Diego	Conventional Rail	O'Neil to Flores Double-Tracking
San Diego	Conventional Rail	Santa Margarita River Bridge Replacement and Double-Tracking
San Diego	Conventional Rail	Fallbrook Junction Track Upgrades
San Diego	Conventional Rail	Del Mar Bluffs Stabilization
San Diego	Conventional Rail	False Bay Passing Track
San Diego	Conventional Rail	Tecolote Creek Track Improvements and Bridge Replacement

Source: Parsons Brinckerhoff, California High-Speed Train Program Environmental Impact Report/Environmental Impact Statement, *System Alternatives Definition*, November 18, 2002

1.3.2 Modal Alternative

There are currently only three main options for intercity travel between the major urban areas of San Diego, Los Angeles, the Central Valley, San Jose, Oakland/San Francisco, and Sacramento: vehicles on the interstate highway system and state highways, commercial airlines serving airports between San Diego and Sacramento and the Bay Area, and conventional passenger trains (Amtrak) on freight and/or commuter rail tracks. The Modal/System Alternative consists of expansion of highways, airports, and intercity and commuter rail systems serving the markets identified for the High-Speed Train Alternative. (Figures 1-2 and 1-3) The Modal Alternative uses the same inter-city travel demand (not capacity) assumed under the high-end sensitivity analysis completed for the high-speed train ridership in 2020. This same travel demand is assigned to the highways and airports and passenger rail described under the No-Project Alternative, and the additional improvements or expansion of facilities is assumed to meet the demand, regardless of funding potential and without high-speed train service as part of the system.

The Modal Alternative for the Los Angeles-Orange County-San Diego Region is defined as further expansion of Interstate 5 (beyond the expansion planned under the No-Project Alternative), as well as expansion at the Long Beach Airport. Table 1-2 summarizes the highway expansion components of the Modal Alternative for this Region.

TABLE 1-2

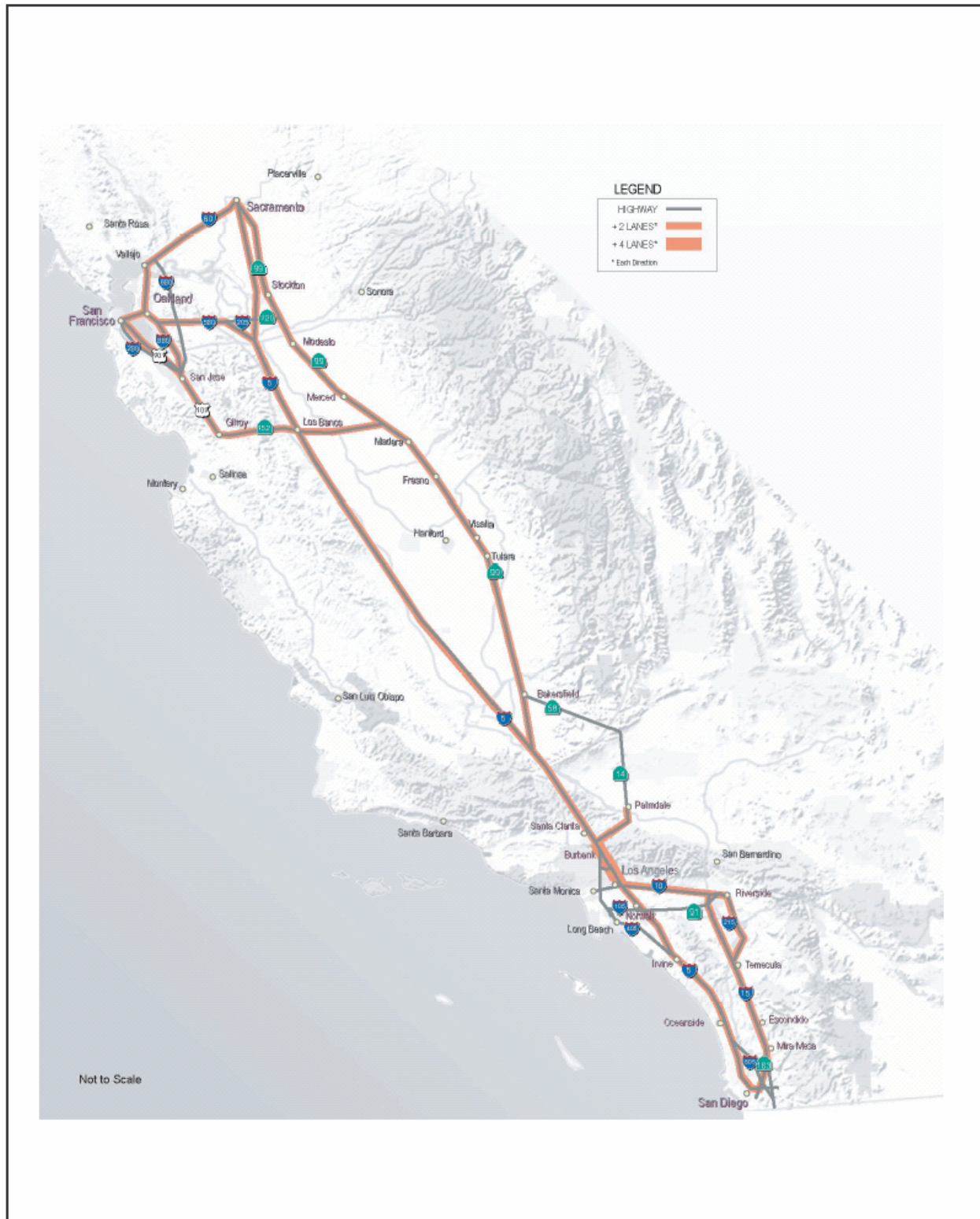
Modal Alternative: Highway Capacity Improvement Options for Year 2020
Los Angeles – Orange County – San Diego Region
 (2020 Intercity Travel Demand with Highway Expansion only)

Highway Corridor	Segment (To-From)	No. of Additional Lanes ¹ (Total – Both Directions)
I-5	L.A. Union Station to I-10	4
I-5	I-10 to Norwalk	2
I-5	Norwalk to Anaheim	2
I-5	Anaheim to Irvine	2
I-5	Irvine to I-405	2
I-5	I-405 to SR-78	2
I-5	SR-78 to University Towne Centre	2
I-5	University Towne Centre to San Diego Airport	2

Source: Parsons Brinckerhoff, California High-Speed Train Program Environmental Impact Report/
 Environmental Impact Statement, *System Alternatives Definition*, November 18, 2002

1. Represents the number of through lanes, in addition to the total number of lanes in the No-Project Highway Network, that approximate an equivalent level of capacity to serve the representative demand.

FIGURE 1-2
Modal Alternative – Highway Component

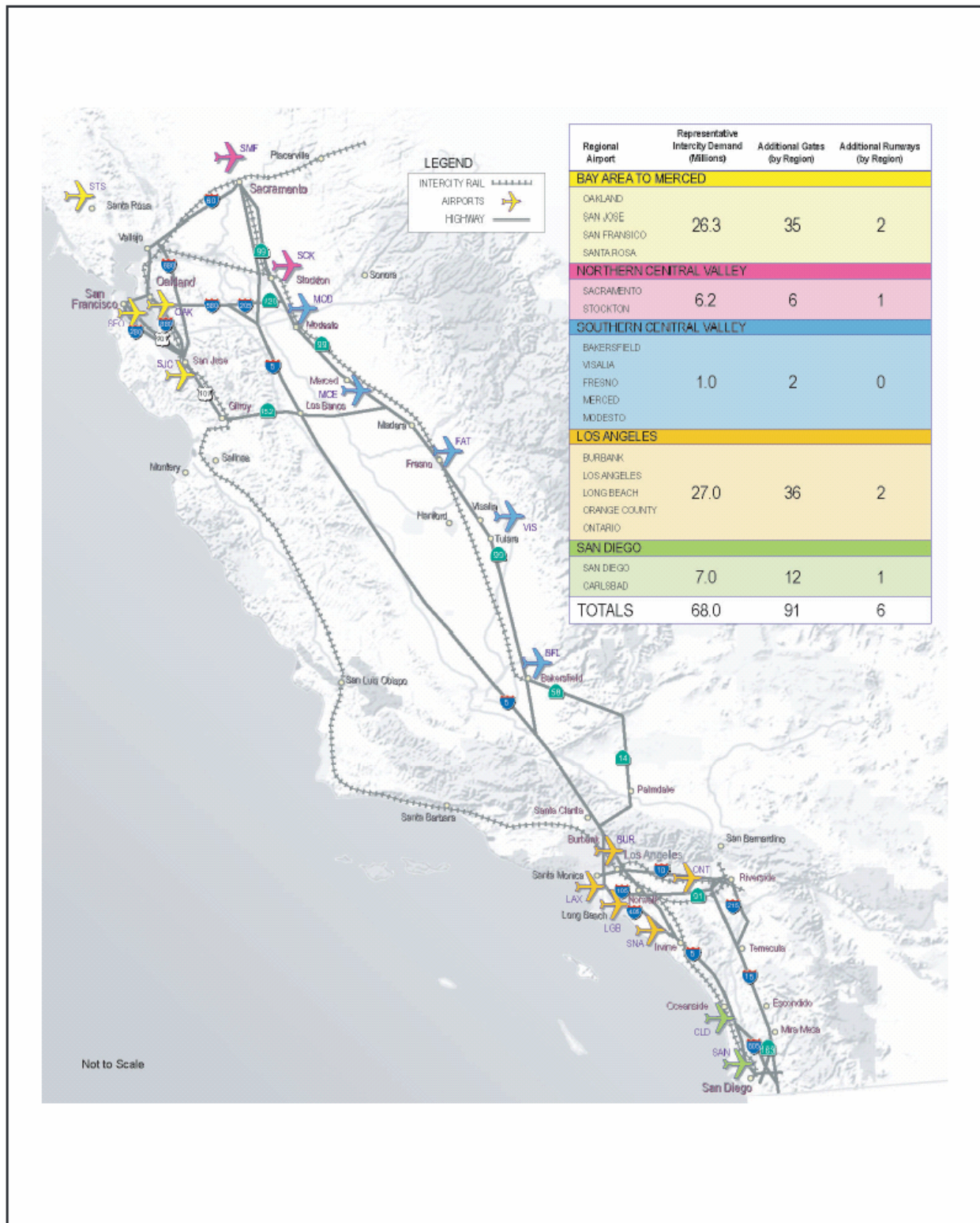


Source : Parsons Brinckerhoff, 2002

FIGURE 1-2

FIGURE 1-3

Modal Alternative – Aviation Component



Source : Parsons Brinckerhoff, 2002

FIGURE 1-3

1.3.3 High-Speed Train Alternative

The Authority has defined a statewide high-speed train (HST) system capable of speeds in excess of 200 miles per hour (mph) (320 kilometers per hour [km/h]) on dedicated, fully grade-separated tracks, with state-of-the-art safety, signaling, and automated train control systems. State of the art high-speed steel-wheel-on-steel-rail technology is being considered for the system that would serve the major metropolitan centers of California, extending from Sacramento and the San Francisco Bay Area, through the Central Valley, to Los Angeles and San Diego (Figure 1-4).

The High-Speed Train Alternative includes several corridor and station options. A steel-wheel on steel-rail, electrified train, primarily on exclusive right-of-way with small portions of the route on shared track with other rail is planned. Conventional “non-electric” improvements are also being considered along the existing LOSSAN rail corridor from Los Angeles to San Diego. The train track would be either at-grade, in an open trench or tunnel, or on an elevated guideway, depending on terrain and physical constraints.

In the Los Angeles-Orange County-San Diego Region, the High-Speed Train Alternative consists of electrified rail options north of Irvine (described in this report as High-Speed Rail or HSR), and improvements and options for the existing LOSSAN rail corridor between Los Angeles and San Diego (described in this report as Conventional Rail).

For purposes of comparative analysis the HST corridors will be described from station-to-station within each region, except where a by-pass option is considered when the point of departure from the corridor will define the end of the corridor segment. Table 1-3 summarizes the segments, improvements, and alignment and station options evaluated for the Los Angeles-Orange County-San Diego Region. The alignment segments are shown (north to south) in Figures 1-5A, B and C. These figures also show the proposed construction type for each alignment option (open trench, covered trench, tunnel, at-grade, or elevated), and where the alignment options would be located outside of an existing rail corridor.

LOSSAN Corridor Screening Process

A strategic planning process was undertaken as part of the evaluation of Conventional Rail improvements in the LOSSAN Corridor. This process was used to gain additional public input on the various rail improvement options being considered, and to reduce the number of alternatives to those that most reasonably and feasibly can meet the objectives, purpose, and need for the project. There are four locations within the LOSSAN Corridor where the initial range of alternatives was sufficiently broad to allow for the screening, or narrowing, of the alternatives to be carried forward in the Program EIR/EIS: San Juan Capistrano, Dana Point/San Clemente, Encinitas, and Del Mar.

Based on public and agency input, and technical, environmental and economic evaluations, a number of alternatives described in this technical report were subsequently eliminated from further consideration. The alternatives eliminated are shown in Table 1-3 in italics and gray shading. The environmental evaluation of these alternatives is included in this technical report, and was considered in the screening process. More detail on the screening process for the LOSSAN Corridor can be found in the final *Los Angeles to San Diego via Orange County Conventional Improvements Screening Report* (Authority, 2003).

FIGURE 1-4

High-Speed Train Alternative – Corridors and Stations for Continued Investigation



Source : Parsons Brinckerhoff, 2002

FIGURE 1-4

TABLE 1-3

**Alignment and Station Options for High-Speed Train Alternative
Los Angeles – Orange County – San Diego Region**

Alignment Segments and Station Locations Evaluated¹	Description of Proposed Options & Improvements
HIGH-SPEED RAIL (HSR) & STATION OPTIONS	
LAX To Union Station	Construction of an electrified, grade-separated, dedicated track within an existing rail corridor. The train would be on an elevated structure from Union Station to Alameda Street, then transition into a trench that ends at LAX.
Stations	
LAX	New underground station.
Union Station To Anaheim Station via UPRR	Construction of an electrified, grade-separated, dedicated track within an existing rail corridor. Train would be on an elevated structure from Union Station, go into a trench at Slauson Avenue, move to at-grade across San Gabriel River, return to a trench up to La Canada Verde Creek, then become an aerial structure to Edison Field where it would go underground to a depressed station.
Stations	
Norwalk	New elevated station.
Anaheim	New underground station, built beneath existing station.
Union Station To Irvine Station via LOSSAN	Construction of fully grade-separated tracks within existing rail corridor, to be shared by electrified and conventional trains.
Stations	
Norwalk	Existing station. Proposed improvements include bypass tracks and additional parking.
Fullerton	Existing station. Proposed improvements include bypass tracks and additional parking.
Anaheim	Existing station. Proposed improvements include bypass tracks and additional parking.
Santa Ana	Existing station. Proposed improvements include bypass tracks and additional parking.
Irvine	Existing station. Expanded platform and parking, "terminal" tracks.
CONVENTIONAL RAIL (LOSSAN CORRIDOR) & STATION OPTIONS	
Union Station To Fullerton Station 4th Main Track	Construction of fourth main track in existing rail corridor between Commerce and Fullerton. Improvements can probably be accommodated within existing LOSSAN ROW except between Rio Hondo River and San Gabriel River.
Fullerton Station To Irvine Station	
Alignment Options:	
AT-GRADE between Walnut Ave (Orange) and E. 17th St. (Santa Ana)	Grade separations at street intersections between Walnut Ave. (in Orange) and E. 17 th Street in Santa Ana. At-grade curve straightening between Batavia Street and Walnut Ave. Improvements would be in existing rail corridor ROW, except for the curve realignment.
TRENCH between Walnut Ave (Orange) and E. 17th St. (Santa Ana)	Fully grade-separate existing rail corridor in a covered trench (same alignment as above), including curve straightening.
Stations	
Fullerton	Existing station. Proposed improvements include bypass tracks, platform reconfiguration, and additional parking.
Anaheim	Existing station. Proposed improvements include bypass tracks and additional parking.
Santa Ana	Existing station. Proposed improvements include bypass tracks and additional parking.
Irvine	Existing station. Proposed improvements include bypass tracks and additional parking.

¹ Conventional Rail (LOSSAN Corridor) alignment and/or construction options shown in italics and gray shading were eliminated from further evaluation during the LOSSAN Corridor Strategic Plan screening process. See text for more detail.

TABLE 1-3

**Alignment and Station Options for High-Speed Train Alternative
Los Angeles – Orange County – San Diego Region (continued)**

Alignment Segments and Station Locations Evaluated¹	Description of Proposed Options & Improvements
Irvine Station To San Juan Capistrano City Limits (no improvements)	No improvements are proposed for this conventional rail segment under the High-Speed Train Alternative.
San Juan Capistrano (City Limits to Avenida Aeropuerto)	
Alignments	
<i>Covered TRENCH/Cut-Fill between Trabuco Creek and Avenida Aeropuerto (trench goes under San Juan Creek); Double tracking</i>	<i>Double-tracking via an open trench along the approach to and departure from the San Juan Capistrano Station (relocated from the existing track location on the west side of the station to the east side of the station), and a covered trench under the parking area at the station. This option would include curve realignment at San Juan Creek</i>
TUNNEL along I-5 between Hwy 73 and Avenida Aeropuerto (tunnel under Trabuco Creek and San Juan Creek); Double tracking	Double-tracking in a tunnel running the length of the City of San Juan Capistrano under Interstate 5.
AT-GRADE and Open TRENCH along east side of Trabuco Creek	Double-tracking at grade and in an open trench along the east side of Trabuco Creek, west of the existing rail alignment.
Stations	
San Juan Capistrano	Existing station (for Covered Trench alignment only): Proposed improvements include double tracking (by-pass tracks) and parking expansion. New station would be constructed with the At-Grade/Open Trench option along Trabuco Creek. New station would be below-grade in open trench. No station would be included in San Juan Capistrano for the I-5 tunnel option.
Dana Point/San Clemente (Avenida Aeropuerto To San Onofre Power Plant)	
Alignments	
<i>Dana Point Curve Realignment; San Clemente - SHORT TRENCH; Double Tracking</i>	<i>Double-tracking and straightening existing curve at Dana Point between San Juan Creek and Avenida Aeropuerto along the existing rail corridor; double-tracking in existing rail alignment in San Clemente in a covered trench for about 1,000 feet either side of the pier.</i>
<i>Dana Point Curve Realignment; San Clemente - LONG TRENCH; Double Tracking</i>	<i>Double-tracking and straightening existing curve at Dana Point between San Juan Creek and Avenida Aeropuerto along the existing rail corridor; double-tracking generally along existing rail corridor through San Clemente in a covered trench from about one mile north of San Mateo Creek to about 4,000 feet north of the pier. This trench option includes one section that leaves the existing corridor and goes underneath residences located west of the corridor between the municipal pier and North El Camino Real.</i>
Dana Point Curve Realignment; San Clemente - SHORT TUNNEL; Double Tracking	Double-tracking and straightening existing curve at Dana Point in existing rail corridor; double-tracking via a short tunnel that follows Interstate 5 between Palm Drive and San Onofre State Beach, north of the power plant. The short tunnel alignment leaves the Interstate 5 corridor at Avenida Palizada, turns toward the coast and runs underneath residential, industrial and vacant areas, connecting with the existing rail corridor just south of Camino Capistrano.

¹ Conventional Rail (LOSSAN Corridor) alignment and/or construction options shown in italics and gray shading were eliminated from further evaluation during the LOSSAN Corridor Strategic Plan screening process. See text for more detail.

TABLE 1-3

**Alignment and Station Options for High-Speed Train Alternative
Los Angeles – Orange County – San Diego Region (continued)**

Alignment Segments and Station Locations Evaluated¹	Description of Proposed Options & Improvements
<i>San Clemente - LONG ONE-SEGMENT TUNNEL ; Double Tracking (crosses San Mateo and San Onofre Creeks)</i>	<i>Double-tracking via a long, one- segment tunnel following Interstate 5 from San Onofre State Beach to Avenida Aeropuerto in San Juan Capistrano. This option precludes the need for curve realignment at Dana Point. The existing rail corridor along the coast between southern San Clemente city limits to approximately Avenida Aeropuerto in San Juan Capistrano would be removed from service (or at least not be further improved from its existing condition).</i>
San Clemente - LONG TWO-SEGMENT TUNNEL; Double Tracking (crosses San Mateo and San Onofre Creeks)	Double-tracking via a long, two- segment tunnel following Interstate 5 from San Onofre State Beach to Avenida Aeropuerto in San Juan Capistrano. This option precludes the need for curve realignment at Dana Point. This tunnel would have the same alignment as the one-segment long tunnel above except in a one-mile stretch near Avenida Pico, it would veer to the east edge of I-5 and daylight into an open trench for about 1,000 feet. The existing rail corridor along the coast between southern San Clemente city limits to approximately Avenida Aeropuerto in San Juan Capistrano would be removed from service (or at least not be further improved from its existing condition).
Stations	
San Clemente	The trench options for this segment would include a proposed below-grade station south of the municipal pier to replace the existing San Clemente Station. The tunnel options would eliminate the need for a train station downtown; a new below-grade station would be constructed along the tunnel alignment where the tunnel transitions to a trench.
Camp Pendleton (San Onofre Power Plant to Oceanside City Limits - Double tracking; crosses San Mateo, San Onofre, and Santa Margarita Creeks)	Construction of an at-grade second main track, in portions of this segment covering about six miles, that are not already double-tracked or will be under the conventional rail improvements included in the No Build Alternative.
Oceanside/Carlsbad (Oceanside City Limits to Encinitas City Limits)	
Alignments	
Carlsbad - AT-GRADE; double tracking; crosses San Luis Rey, Buena Vista , Aqua Hedionda, and Batiquitos Lagoons	Double-tracking through Carlsbad in existing rail alignment at grade.
Carlsbad -TRENCH; double-tracking; crosses San Luis Rey, Buena Vista, Aqua Hedionda, and Batiquitos Lagoons	Double-tracking through Carlsbad in existing rail alignment in trench.
Stations	
Oceanside	Existing station. Proposed improvements include bypass tracks and parking expansion.

¹ Conventional Rail (LOSSAN Corridor) alignment and/or construction options shown in italics and gray shading were eliminated from further evaluation during the LOSSAN Corridor Strategic Plan screening process. See text for more detail.

TABLE 1-3

**Alignment and Station Options for High-Speed Train Alternative
Los Angeles – Orange County – San Diego Region (continued)**

Alignment Segments and Station Locations Evaluated¹	Description of Proposed Options & Improvements
Encinitas/Solana Beach (Encinitas City Limits to Solana Beach Station)	
Alignments	
Encinitas - AT-GRADE; Double Tracking; crosses San Elijo Lagoon	Double-tracking primarily at-grade, with a short trench segment for the rail corridor on either side of Birmingham Drive. This option would include reconfiguring the street intersection at Birmingham Drive and San Elijo Avenue, and close Chesterfield Drive at San Elijo Avenue. Another grade separation would occur at Leucadia Boulevard where the tracks would be depressed. Pedestrian undercrossings would be placed along the route.
Encinitas - SHORT TRENCH; Double Tracking; crosses San Elijo Lagoon	Double-tracking in same alignment as at-grade option above, but with an additional covered trench under Encinitas Boulevard and a transitional open trench about 1,500 feet either side of Encinitas Boulevard.
<i>Encinitas - LONG TRENCH; Double Tracking; crosses San Elijo Lagoon</i>	<i>Double-tracking in same alignment as options described above. Tracks would be in an open trench south of the Batiquitos Lagoon, then drop into a covered trench as they approach the downtown area, then return to an open trench up to the north end of the San Elijo Lagoon, where they transition to at-grade. Chesterfield Drive at San Elijo Avenue would be closed. Pedestrian crossings would be placed along the route.</i>
Stations	
Solana Beach	Existing station. Proposed improvements include platform modifications and parking expansion.
Del Mar (Solana Beach Station to I-5/805 Split)	
Alignments	
<i>COVERED TRENCH on bluffs; crosses San Dieguito and Los Penasquitos Lagoons</i>	<i>Double-tracking in a covered trench in the existing rail corridor alignment along the bluffs.</i>
TUNNEL under Camino Del Mar; crosses San Dieguito and Los Penasquitos Lagoons	Double-tracking via a tunnel underneath Camino Del Mar. Tunnel would begin at Jimmy Durante Boulevard, and daylight at Carmel Valley Road where tracks would then connect with the existing alignment across Los Penasquitos Lagoon. The existing rail track on the bluffs would be removed from service.
TUNNEL along I-5; crosses San Dieguito and Los Penasquitos Lagoons	Double-tracking via a tunnel that would run under Interstate 5 and daylight along the southern boundary of San Dieguito Lagoon. Tracks would reconnect with the existing rail at-grade near the Del Mar race track. The existing rail track on the bluffs would be removed from service.
I-5/805 Split To Hwy 52	
Alignments	
Miramar Hill Tunnel	Double-tracking via a tunnel through Miramar Hill.
I-5 Tunnel	Double-tracking via a tunnel under Interstate 5.
Stations	
UTC (Only applies to Miramar Hill Tunnel)	New station, proposed only with the Miramar Hill tunnel option. Station would be constructed underground.
Hwy 52 To Santa Fe Depot (Curve realignment; Double Tracking; San Diego River Bridge; Trench between Sassafras St and Cedar St)	Double-tracking in existing rail corridor for full length of segment. An existing curve just south of Highway 52 would be straightened, requiring two new bridges over wetlands in San Clemente Canyon. New bridges would also be constructed over Tecolote Creek and San Diego River. Tracks would be placed in a trench between Sassafras Street and Cedar Street.
Stations	
Santa Fe Depot	Existing station. Proposed improvements include bypass tracks and parking expansion.

¹ Conventional Rail (LOSSAN Corridor) alignment and/or construction options shown in italics and gray shading were eliminated from further evaluation during the LOSSAN Corridor Strategic Plan screening process. See text for more detail.

FIGURE 1-5A

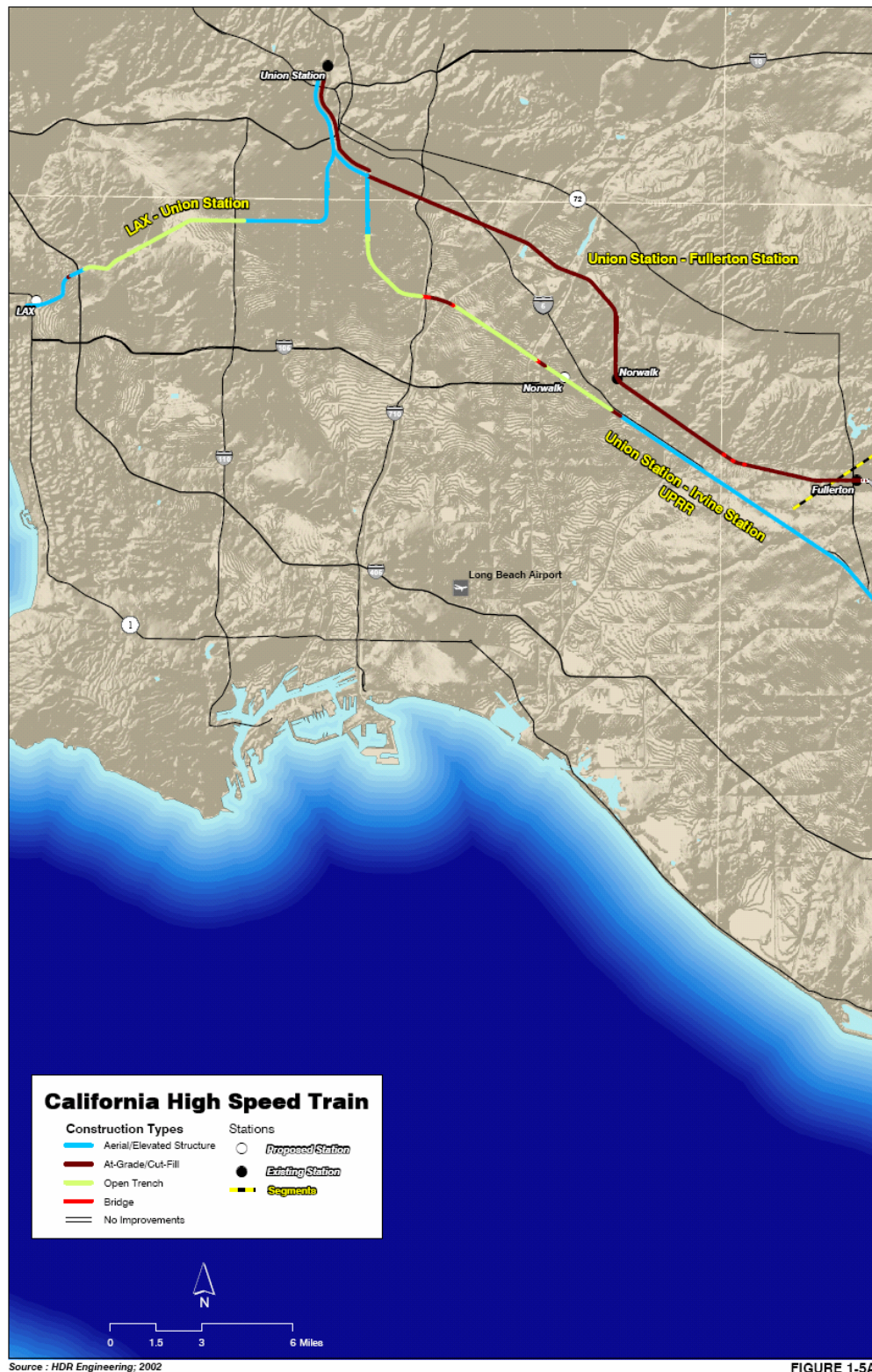
**High-Speed Train Alternative: Alignment and Construction Type by Segment
(Los Angeles to Fullerton)**

FIGURE 1-5A